

S M T W T F S

Date: 30/6/2020.

Name

M. Zeesham

ID

16529

Semester

2<sup>nd</sup>

Subject

LCA (Lab)

Dept:

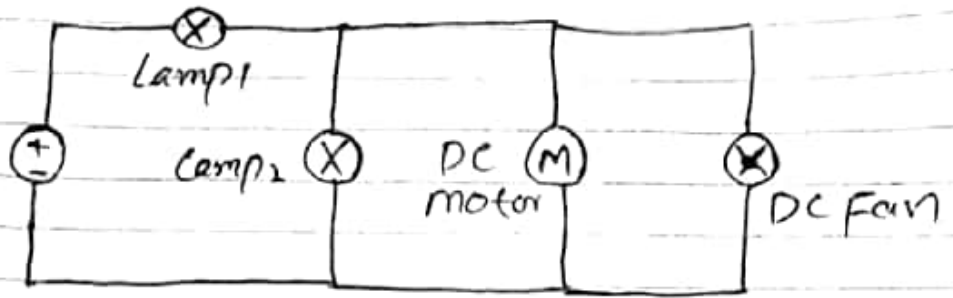
BE Electrical.

Assignment No

#

Date 30/6/2020

Ans: Figure:



Solution:

Solving through nodals

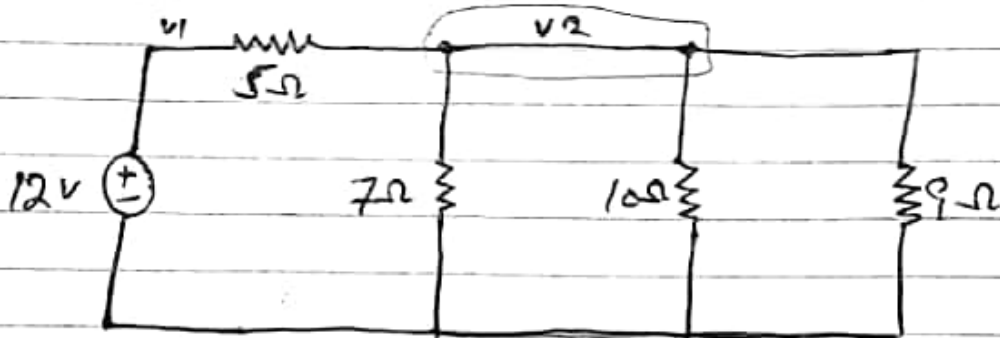
Let

$$R_1 = 5$$

$$R_2 = 7$$

$$R_3 = 10$$

$$R_4 = 9$$



Applying KCL on  $v_1$

$$\frac{v_2 - v_1}{5} = 12$$

$$v_1 - v_2 = 60$$

Applying KCL at node 2

$$\frac{V_2 - V_1}{5} + \frac{V_2}{7} + \frac{V_2}{10} + \frac{V_2}{6} = 0$$

$$126V_2 - 126V_1 + 90V_2 + 63V_2 + 70V_2 = 0$$
$$630$$

$$-126V_1 + 319V_2 = 0$$
$$630$$

$$-0.2V_1 + 0.6V_2 = 0$$

Multiplying 0.1 with eq (1)

$$0.2V_1 - 0.6V_2 = 12 \quad \text{--- (2)}$$

Subtracting from eq (2)

$$-0.2V_1 + 0.6V_2 = 0$$

$$0.2V_1 - 0.6V_2 = 12$$

$$= 0.4V_2 = 12$$

$$V_2 = 30V$$

Putting in eq (1)

$$0.2V_1 = 18$$

(2)  
 $V_1 = 90V$

(1) Find current  
current across  $R_1$

$$I = V/R$$

$$I = 90/5 = 18A$$

current across  $R_2$

$$I_2 = V/R$$

$$= 30/7 = 4.3A$$

current across  $R_3$

$$I = V/R$$

$$= 30/10 = 3A$$

current across  $R_4$

$$I = V/R$$

$$I = 30/9 = 3.3A$$

Result =  $I_1 = 18A$   
 $I_2 = 4.3A$   
 $I_3 = 3A$   
 $I_4 = 3.3A$

(ii)

Find voltage

voltage across  $R_1$

$$V = IR$$

$$V = (18)(5) = 90V$$

V across  $R_2$

$$V = IR$$

$$V = (4.3)(7) = 30.1V$$

V across  $R_3$

$$V = IR$$

$$V = (3)(10) = 30V$$

V across  $R_4$

$$V = IR$$

$$V = (3.3)(9) = 29.7$$

Result:

$$V_1 = 90V$$

$$V_2 = 30.1V$$

$$V_3 = 30V$$

$$V_4 = 29.7V$$

(iii) Finding power across each resistor

$$\begin{aligned}P(R_1) &= (I_1)(V_1) \\ &= (18)(90) \\ &= 1620 \text{ mW}\end{aligned}$$

$$\begin{aligned}P(R_2) &= (I_2)(V_2) \\ &= (4.3)(30.1) \\ &= 129.43 \text{ mW}\end{aligned}$$

$$\begin{aligned}P(R_3) &= (I_3)(V_3) \\ &= (3)(30) \\ &= 90 \text{ mW}\end{aligned}$$

$$\begin{aligned}P(R_4) &= (I_4)(V_4) \\ &= (3.3)(29.7) \\ &= 98.01 \text{ mW}\end{aligned}$$

Result:

$P_1 =$	1620 mW
$P_2 =$	129.43 mW
$P_3 =$	90 mW
$P_4 =$	98.01 mW